[illegible] June 1903 [illegible]
[illegible]

Table 2.—*Earthquake of July 9, 1905, N-S.*—Continued.

Duration of first preliminary tremors	17 min. 32 sec.	
Duration of second preliminary tremors	11 " 35 "	
Duration of principal portion	12 " 45 "	
Total duration of earthquake	1 hr. 29 " 50 "	
Average complete period of seven waves in second preliminary tremors		30 sec.
Average complete period of large waves of principal portion		20 to 30 "
Period of pendulum		27 sec.
Maximum double amplitude of actual displacement of the earth at the seismograph		0.81 mm.
Magnification of record		10 times.

The waves are very complex in the principal portion and die away very gradually so that the beginning of the "end portion" is not sharply defined.

Table 3.—*Earthquake of July 22–23, 1905, N-S. component.*

	h.	m.	s.
First preliminary tremors began	10	10	13 p. m.
Second preliminary tremors began	10	25	33 p. m.
Principal portion began	10	39	00 p. m.
Principal portion ended	10	59	00 p. m.
End of earthquake, a. m. July 23	0	21	30 p. m.
Duration of first preliminary tremors	15 min. 20 sec.		
Duration of second preliminary tremors	13 " 27 "		
Duration of principal portion	20 " 00 "		
Total duration of earthquake	2 hr. 11 " 17 "		
Period of pendulum			26 sec.
Maximum double amplitude of actual displacement of the earth at the seismograph			5.40 mm.
Magnification of record			10 times.

Largest earthquake yet recorded.

Table 4.—*Earthquake of July 22–23, 1905, E-W. component.*

	h.	m.	s.
First preliminary tremors began	10	11	00 p. m.
Second preliminary tremors began	10	24	00 p. m.
Principal portion began	10	30	40 p. m.
Principal portion ended	10	53	00 p. m.
End of earthquake, a. m., July 23	0	46	15 p, m.
Duration of first preliminary tremors	13 min. 00 sec.		
Duration of second preliminary tremors	6 " 40 "		
Duration of principal portion	22 " 20 "		
Total duration of earthquake	2 hr. 35 " 15 "		
Period of pendulum			30 sec.
Maximum semiamplitude of actual displacement of the earth at the seismograph (to the west)			5.4 mm.
Magnification of record			13.2 times.

The pen went off the sheet to the east three times, viz, more than five millimeters, hence actual displacement exceeded eleven millimeters.

A critical examination of the wave motions as they are found recorded in the various records thus far obtained has led us to the opinion that the so-called steady mass of the seismograph fails to remain at rest as completely as it is generally supposed to do. In other words the motion of the earth soon sets the "steady mass" itself to swinging more or less, so that the trace finally resulting from the two movements is not a faithful record of the motions of the earth. The problem of completely separating the one motion from the other is very complex and difficult, and a full analysis has not thus far been brought out. Some notes presenting an approximate method of analysis have recently been employed and the results obtained will be given in a future communication to the Review.

TIDES AND THUNDERSTORMS.

By John C. Beans, Cooperative Observer, Moorestown, N. J.

A recent circular requesting observations on the course of thunderstorms reminds me of certain articles and communications in the Monthly Weather Review during the past year and the strong inclination I felt at those times to send in a communication disparaging the idea of perceptible inductive influence of tidal currents on atmospheric vapors, nay, on air currents too and whole thunderstorms as suggested.

Some years ago my father was a considerable grower of strawberries, employing some forty pickers daily. Many of these came from the village of Bridgeboro, then a considerable sailing packet port on the Rancocas two or three miles from the Delaware, but doing business several miles farther up, chiefly to Philadelphia. Navigating these sloops and schooners against wind and tide on rather narrow and crooked streams and between showers, if possible, developed in the captains and hands of these craft an alertness and shrewdness in observing the ways of the weather, probably not yet excelled, except by the educated part of the weather service. They would look at a possible coming shower, observe the state of the tide, and remark that if the tide was running up, the shower would go up the Delaware River, but if the tide was running down the shower might be expected to go up the Rancocas Creek, and we would get some. Ever since then showers have continued going sometimes in line with the Delaware, sometimes with the Rancocas, sometimes elsewhere. Those pickers generally knew the state of the tide, for two or three of the packets usually sailed past them daily. I can now see approximately the stage of the tide from my home, but I do not keep in mind its course and have not always a Public Ledger Almanac. However, with a farmer's need of rain lore, I have been watching showers (and for showers) these 35 years, but have not seen any four-times-a-day changeableness in the course of showers, nor any other changeableness that the tidal theory might lead to. The course of showers has often been with that of middle clouds when such appear. Did these old navigators of Delaware Bay get their theory from their fellow craftsmen, the farmers of Cape May County, and expect it to apply to all streams?

HAS THE RAINFALL OF SOUTHERN CALIFORNIA BEEN AFFECTED BY ANY SO-CALLED RAINMAKER?

During the discussion in southern California in April, 1905, over the merits of an individual calling himself a rainmaker, there was sent out by the Associated Press a general news despatch that seems to show there are a few believers in the supernatural still left over to this enlightened age. It behooves the press, as the leader of public opinion, to do what it can to enable the public to appreciate the influence of man on the weather.

From Los Angeles to San Bernardino is an eastward stretch of 75 miles; the railroad runs from the Pacific coast eastward along the southern slope of the San Gabriel, Cucamonga, and San Bernardino ranges of mountains. Los Angeles is about twenty miles east and also twenty miles north of the curved coast line. Pasadena is ten miles northeast of that and Altadena five miles north of that. The new Solar Observatory of the Carnegie Institution is on Mount Wilson near Pasadena. This whole region is a garden under the latitude of 34° north receiving moderate winter rains and an abundance of sunshine and needing only a wise supervision of the irrigation ditches to produce the most beautiful and profitable tropical plantations. The photographs reproduced in the Monthly Weather Review for November, 1903, give a fair idea of the character of this garden spot. The general details as to orography may be seen in the relief map published in Bulletin L, Climate of California, by Prof. A. G. McAdie. It is easily understood by the meteorologist that northerly winds coming over the mountain ranges will bring dry and dusty weather, clear sky, hot days, and cool nights. Southerly winds, especially southwest winds, will push moist ocean air up the mountain slopes and give cloud and local rains to the southern slopes. Further details and tables of rainfall are given by Professor McAdie in the above-mentioned bulletin. In such a climate all vegetation depends on the rainfall of the winter season and the monthly tabular values of rain should be summed up from October to May continuously if we would know how much water is available for the regular annual crop or what are the important annual and secular variations of rainfall as was shown by the Editor in the MONTHLY WEATHER REVIEW for January, 1904, page 24.

On the other hand, when any one deceives himself or the community into the silly belief that he has been able to increase or diminish the rainfall by his own personal acts, we are able to quote the records of many past years showing that the rainfall has always had a certain amount of variability and that his rainmaking experiments have not produced any effect as to rain or drought that is contrary to the natural and well established order of events.

The tables on page 77 of Bulletin L give the rainfall measured at the Weather Bureau station at Los Angeles since 1877 for each winter season, viz, from September 1 to September 1; the following copy has been corrected and extended throughout the later years by the official in charge of the Records Division at the Central Office, Washington, D. C.:

12 months beginning September 1.	Rainfall, in inches.	12 months beginning September 1.	Rainfall, in inches.
1877	21.26	1891	11.86
1878	11.35	1892	26.27
1979	20.34	1893	6.74
1880	13.13	1894	16.10
1881	10.40	1895	8.54
1882	12.11	1896	16.83
1883	38.26	1897	7.13
1884	9.25	1898	5.53
1885	23.18	1899	7.90
1886	14.01	1900	16.38
1887	14.16	1901	10.51
1888	9.57	1902	19.32
1889	34.60	1903	8.89
1890	13.33	1904	19.35

From this we see that in the course of 28 successive seasons at Los Angeles there have occurred—

6 having a rainfall of 20 inches or more.
6 having a rainfall of 15 to 19 inches.
9 having a rainfall of 10 to 14 inches.
7 having a rainfall of 9 inches or less.

This table shows that wet seasons are as frequent as dry ones. In nearly every case a dry season is followed by a wet one. A rainmaker discharging mysterious gases into the air daily from September to May will have no right to claim that he has power to compel or induce rain until he can show that he has done better than unaided nature is herself doing for the place where he operates.

The proper statistical method of argumentation is illustrated in the following extract from the Daily Times of Los Angeles, Cal., April 23, 1905.

I note, says Dr. Garrett Newkirk of Pasadena, that a certain gentleman who appears to imagine that he has had something to do with the making of rain in southern California, by means of some sort of chemicals or gaseous exploitation upon the patient atmosphere, is advertised to give a series of lectures in Los Angeles and elsewhere, telling how he did it.

It is hard to understand how anyone with a modicum of sense and the statistics of rainfall before him could suppose for a moment that southern California has had a drop more or less of rain because of that little black box on the side hill at Esperanza. We have had so far at the Los Angeles observatory some eighteen or nineteen inches of rain for the season of 1904–5. On and near the mountains, as usual, there may have been a few inches more. We have not had a remarkable rainfall, nothing, in fact, unusual, except that on two occasions the storms were violent on the mountain slopes, causing floods in certain parts of the valley.

Why do people insist on forgetting that only two years ago we had a greater rainfall for the season than we have had so far this year.

Leaving out the three dry years, the average rainfall by standard measurement has been 16.49 inches since the year 1877, so that the amount this season has not been more than two or three inches above the general average. The three dry years made such a deep impression on the minds of those who lived through them, that they have been over sensitive and apprehensive of drought ever since. In the good years of 1900–1901 and 1902–3 the showers were evenly distributed through their seasons, with much of sunshine between. Jupiter Pluvius was in gentle mood. No water went to waste. But people were not fully impressed. This year, with a deluge once or twice repeated, all their hands went up. It is safe to say that more water went into the ground two years ago than in this season of impressive storms.

The influences governing our rainfall extend over great regions and distances—north to the polar wastes, east to mountain and desert, south and west thousands of miles over the illimitable waters of the sea. For thousands of years, no doubt, the changing seasons came to the region where we dwell, before Columbus crossed the sea or the modest Balboa stepped into the Pacific and "took possession" of all the land touched by its waters. The average rain of a hundred years might be a bit more or less than that of the last 25, but of this we are reasonably sure that in each century of time there will be somewhere about 1600 inches quite irregularly distributed year by year.

METEOROLOGICAL RECORDS AT ORONO, ME.

By Prof. JAMES S. STEVENS. Dated Orono, Me., February 1, 1905.

The following is a continuation of an article on the meteorology of Orono, on the Penobscot River near Bangor, Me.; the section on barometry was published in the MONTHLY WEATHER REVIEW for April, 1904.

2. *Thermometry.*—Temperature observations began to be made by Dr. M. C. Fernald, January 1, 1869. From this date to January 1, 1893, observations were made three times a day, at 7 a. m., 2 p. m., and 9 p. m. In Table 3 the mean of these observations is found by assigning to the 9 p. m. observations

*TABLE 3.—*Monthly mean temperatures at Orono, Me., based on tridaily observations.*

Year.	January.				February.				March.			
	7 a.m.	2 p.m.	9 p.m.	Mean.	7 a.m.	2 p.m.	9 p.m.	Mean.	7 a.m.	2 p.m.	9 p.m.	Mean.
1869	16.6	23.1	18.8	18.4	16.5	27.3	21.6	21.8	18.5	30.6	23.9	24.2
1870	19.2	27.2	21.9	22.6	14.1	26.3	18.0	19.1	22.0	34.2	27.9	28.0
1871	12.6	18.2	16.0	15.7	15.2	25.8	21.2	21.0	30.5	39.6	34.3	34.7
1872	13.8	20.2	15.9	16.5	9.1	26.1	18.7	18.2	12.6	25.8	19.5	19.4
1873	9.7	20.1	15.1	15.0	8.5	22.8	17.4	16.5	21.5	32.6	27.6	27.4
1874	15.3	23.6	19.0	19.2	11.5	23.5	17.5	17.5	22.1	33.2	27.4	27.5
1875	1.1	14.6	9.0	8.4	8.1	18.9	13.5	13.5	18.2	30.4	24.9	24.6
1876	14.5	23.6	18.0	18.5	14.3	24.4	18.2	18.8	22.3	33.2	28.5	28.1
1877	2.8	16.3	9.1	9.3	19.8	31.8	26.1	25.9	24.2	34.1	27.7	28.4
1878	13.1	22.6	16.9	17.4	14.4	30.2	23.1	22.7	27.8	37.3	33.3	32.9
1879	8.1	19.8	13.3	15.6	8.1	23.1	16.8	16.2	21.9	33.4	28.1	27.9
1880	13.5	28.7	21.6	21.4	17.2	28.6	22.8	22.9	20.6	31.6	26.3	26.2
1881	8.7	20.0	12.7	12.2	16.8	28.4	22.9	22.8	30.9	36.2	34.1	33.8
1882	10.7	22.6	16.3	16.5	14.8	28.8	21.9	22.0	23.3	34.3	29.6	29.2
1883	4.1	17.4	11.7	11.2	11.3	23.7	17.2	17.4	15.7	27.7	21.5	21.6
1884	5.2	19.0	14.4	13.3	18.0	27.5	22.2	22.5	20.2	33.2	27.4	27.1
1885	11.1	21.2	15.6	15.9	3.0	21.4	15.3	13.8	11.3	26.6	19.3	19.1
1886	13.9	22.6	18.1	18.2	11.9	23.7	19.5	18.7	20.4	33.1	27.8	27.3
1887	9.5	18.4	14.4	14.2	12.3	22.8	17.1	17.4	20.7	32.3	25.3	25.9
1888	4.7	14.7	8.4	9.1	12.7	25.0	19.5	19.2	22.6	32.6	28.2	27.9
1889	20.6	28.6	24.9	24.8	9.5	19.0	16.1	15.2	27.7	39.5	33.0	33.3
1890	11.9	21.7	18.3	17.6	18.7	28.0	22.1	22.7	22.9	34.9	29.0	28.9
1891	15.8	25.6	20.9	20.8	19.4	27.7	22.7	23.1	23.9	34.9	28.3	28.9
1892	18.0	26.4	22.2	22.2	15.4	30.1	22.5	22.6	20.1	33.3	27.7	27.2
Mean	11.4	21.5	16.4	16.5	13.2	25.6	19.7	19.5	21.3	33.1	27.5	27.9

Year.	April.				May.				June.			
1869	35.3	45.1	38.2	39.2	45.1	59.2	48.8	50.5	.....	.....	.....	.....
1870	37.5	51.9	41.9	43.3	46.9	60.6	48.8	52.0	61.5	74.5	62.0	65.0
1871	36.1	46.8	40.1	40.8	44.9	58.4	48.2	49.9	57.7	70.2	58.6	61.3
1872	34.7	47.4	38.6	39.8	48.7	57.9	49.8	51.6	59.9	71.6	61.3	63.5
1873	35.4	45.4	37.8	39.1	47.9	61.1	48.7	51.6	55.5	69.2	57.5	59.9
1874	29.0	38.8	32.1	33.0	46.8	59.7	49.1	51.2	65.4	66.7	58.4	59.7
1875	31.7	43.2	34.8	36.1	47.2	59.6	49.5	51.8	56.8	68.9	57.8	60.3
1876	34.5	45.6	37.8	38.8	46.0	58.0	47.8	49.9	60.8	73.6	61.8	64.5
1877	37.4	51.3	41.8	43.1	47.7	61.6	50.5	52.6	60.3	72.0	60.2	63.2
1878	40.4	51.4	42.8	44.4	50.4	61.2	52.4	54.1	57.9	70.7	58.6	61.5
1879	33.5	45.2	37.0	38.2	50.8	65.4	52.7	55.0	57.1	66.0	57.1	59.3
1880	36.1	47.7	38.5	40.2	51.7	55.4	53.9	56.2	60.6	71.0	60.5	63.2
1881	33.3	46.7	39.2	39.6	47.7	59.9	51.5	52.7	54.4	68.1	55.4	58.3
1882	32.2	41.8	35.6	36.3	44.9	57.2	47.7	49.4	59.2	70.1	60.1	62.4
1883	34.5	45.9	37.6	38.9	47.0	59.6	50.5	51.9	62.6	72.3	61.3	64.4
1884	38.7	48.6	41.5	42.6	47.4	57.4	47.7	50.0	60.6	74.5	61.8	64.7
1885	35.8	48.9	39.1	40.7	47.7	61.5	49.3	51.9	58.9	69.6	59.3	61.8
1886	38.3	52.5	41.5	43.5	49.5	62.3	50.9	53.4	59.7	70.0	57.9	61.4
1887	32.3	44.4	36.7	37.5	47.7	64.6	53.0	54.6	59.9	70.9	59.7	62.6
1888	33.1	44.3	36.3	37.5	46.9	59.0	48.8	50.9	60.8	70.2	60.0	62.8
1889	40.2	53.4	43.3	45.1	52.7	66.8	53.0	56.4	62.9	72.5	62.1	64.9
1890	35.3	47.9	38.8	40.2	49.3	59.4	50.6	52.5	57.8	66.6	57.2	59.7
1891	37.7	47.9	40.1	41.4	47.1	60.6	50.2	52.0	57.6	69.1	58.0	60.8
1892	37.8	52.9	41.0	43.2	48.0	58.4	49.9	51.6	58.3	71.7	61.0	63.0
Mean	35.4	47.3	38.8	40.1	47.9	60.2	50.0	52.3	59.0	70.9	59.4	62.1

*The numbers of these tables are in continuation of the previous article in MONTHLY WEATHER REVIEW for April, 1904.